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REMARKS

Claims 1-6 are currently pending in the application. By this amendment, claims 2 and 5 are amended for the Examiner's consideration to overcome the objection. The specification is also amended to overcome the objection. No new matter is added. Reconsideration of the rejected claims in view of the following remarks is respectfully requested.

Objection to Claims and Specification

The claims and specification were objected to based on informalities. Claims 2 and 5 are amended to define the following reference characters.

" $\forall \tau$ ", " δi " and " μ "

The specification is also amended to define $\forall \tau$.

Applicants further submit that the specification clearly describes the manner in which the optimization problem can be solved using the features of the claimed invention.

Applicants request withdrawal of the objection.

35 U.S.C. §103 Rejection

Claims 1-6 were rejected under 35 U.S.C. §103(a) for being unpatentable over U.S. publication No. 2003/0035429 to Mitra. Applicants submit that the rejection of claims 1-6 are rendered moot in view of the submitted Declaration under 37 C.F.R. §1.131, by the named inventors.

More specifically, Applicants submit that the Rule §1.131 Declaration is formally and substantively sufficient to establish that the Inventors had completed the invention defined in at least independent claims 1 and 4 before the effective date of the primary reference to Mitra, i.e., June 4, 2001. The statements in the Declaration show that the formal requirements of §1.131 are

satisfied, namely:

- (1) the rejections to be overcome are under §103(a),
- (2) all the acts for completing the invention of claims 1 and 4 were performed in this country, and
- (3) the effective date of the Mitra reference, i.e., June 4, 2001, is not more than one year prior to the filing date of the present application in this country.

It is respectfully submitted that the statements in the Declaration are also sufficient to satisfy the substantive requirements of 37 C.F.R. §1.131. The Declaration sets forth specific facts, of sufficient character and weight, to establish a date of conception before the effective dates of the Mitra reference of June 4, 2001, and to show that the Inventors and their attorneys exercised due diligence from a time before the effective filing date of the Mitra primary reference to a constructive reduction to practice, i.e., to the filing of the application.

Date of Conception

As stated in the Declaration, a method for optimizing pricing and capacity for bandwidth management and computer readable medium as disclosed and recited in claims 1 and 4 of the application (and those claims dependent thereon) was conceived by the Inventors before the effective date of the Mitra reference.

An IBM Invention Disclosure and accompanying documents is submitted with the Declaration as supporting evidence of this prior date of conception. It is respectfully submitted that the Invention Disclosure and accompanying documents shows that the Inventors had a definite and permanent idea of the complete and operative invention of claims 1 and 4 as presently pending, prior to the June 4, 2001 effective date of the Mitra reference. The supporting documents also show the prior date of conception.

In particular, the accompanying documents show the features of claims 1 and 4. In fact,

the accompanying documents show many of the features filed in the application and used for support for the pending claims. The supporting documents also show that the features of claims 1 and 4 were conceived prior to the effective date of the Mitra reference, i.e., June 4, 2001. Also, Applicants note that the original copy of the Invention Disclosure and accompanying documents shows a date antedating the June 4, 2001 effective date of the Mitra reference. This and all other pertinent dates have been removed from the photocopies of the Invention Disclosure and accompanying documents submitted with the Declaration to prevent any potential prejudice to Applicants.

Applicants further submit that the Declaration filed herewith shows, unequivocally, that the Inventors had in their possession a definite and permanent idea of the complete and operative invention of claims 1 and 4 before June 4, 2001 in a manner sufficient to satisfy the requirements of conception, as set forth in M.P.E.P. §715.07 and §2138.04, and thus constitute *prima facie* evidence of Applicants' date of conception of the invention in this country before the effective date of the Shobaki reference.

Due Diligence

Applicants further submit that the Declaration shows the Inventors and their attorneys exercised due diligence from a time before the June 4, 2001 effective date of the Mitra reference to a constructive reduction to practice, realized by the filing of the above-identified patent application on June 15, 2001. The IBM Invention Disclosure and accompanying documents was completed by the Inventors and forwarded to IBM internal counsel prior to the Mitra reference date of June 4, 2001. IBM authorized outside counsel at the undersigned firm to prepare the application, and supplied the Invention Disclosure and accompanying documents to outside counsel in a timely manner. Numerous discussions between the Inventors and counsel took place until a first draft of the application was forwarded to Inventor, John Tomlin. Revisions were made and subsequent drafts were prepared and reviewed by the Inventors, until a final draft was forwarded to IBM for execution on June 14, 2001, and subsequent filing on June 15, 2001.

Outside patent counsel also acted in an expeditious manner to prepare and forward the application to filing. Under M.P.E.P. §2138.06, only reasonable diligence is required in this regard. More specifically, §2138.06 states that a patent attorney will be held to have exercised reasonable diligence if the attorney worked reasonably hard on the application during the critical period, taking into consideration any backlog of unrelated cases the attorney may have had and his completion of those cases along with the present application in chronological order.

Applicants respectfully submit that the Declaration shows that their patent attorneys acted sufficiently expeditiously to satisfy the requirements of due diligence. Applicants submit that the Declaration submitted herewith are sufficient to show that the Inventors and their attorneys exercised due diligence the due diligence required under 37 C.F.R. §1.131. The Declaration shows that at least one Inventor remained in regular contact with patent attorneys to answer questions, provide technical explanation, and supply the supplemental disclosure materials necessary for enabling the application to be filed in an expeditious manner.

CONCLUSION

Applicants believe that a full and complete response has been made and respectfully submit that all of the objections and grounds for rejection have been rendered moot. The Examiner is respectfully requested to pass the above application to issue.

Respectfully submitted,



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Serial No. 09/881,025



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

Docket No.: 00280668

John A. Tomlin, et al.

Serial No. 09/881,025

Group Art Unit: 3629

Filed: June 15, 2001

Examiner: Igor N. Borissov

For: **SYSTEM AND METHOD FOR
BANDWIDTH MANAGEMENT,
PRICING, AND CAPACITY PLANNING**

Mail Stop: Amendment
Assistant Commissioner for Patents
PO Box 1450
Alexandria, VA 22313

DECLARATION UNDER 37 C.F.R. § 1.131

Sir:

We John A. Tomlin and Xin Guo, do hereby declare:

1. We are co-inventors of the subject matter disclosed and recited in independent claims 1 and 4 of the above-identified application.

2. We completed the invention of claims 1 and 4 (and those claims dependent thereon) in the United States before June 4, 2001, as evidenced below.

CONCEPTION

3. Before June 4, 2001, we conceived of method for optimizing pricing and capacity for bandwidth management using a computer and a computer readable medium as disclosed and recited in independent claims 1 and 4 of the application, of which is evidenced by documentation attached hereto as Exhibit A. The documentation attached hereto is a photocopy of and is identical to the originals, except that all pertinent dates have been removed therefrom.

4. All pertinent dates removed from the documentation attached hereto are before June 4, 2001.

5. The information shown in the documentation was used to complete the application, as now filed.

6. As evidenced by the attachments the method for optimizing pricing and capacity for bandwidth management using a computer includes:

- a. inputting a mean and a variance of real usage for each of a plurality of customer classes;
- b. inputting price and demand curve data which determines an arrival rate for each customer class;
- c. inputting a number of existing customers in each customer class;
- d. inputting a bandwidth wholesale cost;
- e. generate a computer model for an optimization problem subject to a plurality of predetermined chance constraints;
- f. solving said optimization problem using said computer to determine an amount of

bandwidth to be purchased in a time period at a given price for an expected number of new customers in order to maximize profit; and

- g. outputting said amount of bandwidth to be purchased and said expected number of new customers.

7. In further embodiments, as evidenced by the attachments, a computer readable medium comprising software for causing a computer to execute steps for optimizing pricing and capacity for bandwidth management, comprises the steps of:

- a. receiving a mean and a variance of real usage for each of a plurality of customer classes;
- b. receiving price and demand curve data which determines an arrival rate for each customer class;
- c. receiving a number of existing customers in each customer class;
- d. receiving a bandwidth wholesale cost;
- e. generating a computer model for an optimization problem subject to a plurality of predetermined chance constraints;
- f. solving said optimization problem using said computer to determine an amount of bandwidth to be purchased in a time period at a given price for an expected number of new customers in order to maximize profit; and
- g. outputting said amount of bandwidth to be purchased and said expected number of new customers. :

8. The benefits and features of claimed invention are shown and described in the attachments.

9. These features and others are exemplified in the attached documentation, all of which is a complete and permanent idea of the complete and operable invention.

DUE DILIGENCE

10. Prior to June 4, 2001, the inventors worked diligently on the invention as recited in the claimed invention, and the subsequent above-identified application until such application was completed on June 14, 2001.

11. During this time, we worked diligently in providing information to IBM in-house counsel in order to begin the preparation of a patent application for filing in the U.S. Patent Office. All of the inventors were involved in working diligently in providing IBM in house counsel the pertinent information relating to the inventive concept, including completing the attached Inventor Disclosure. For example, the pertinent information was communicated to IBM in-house counsel before June 4, 2001.

12. Prior to the filing of the above-identified application in the U.S. Patent Office, Inventor Tomlin communicated with patent counsel at McGuireWoods LLP, on behalf of all of the inventors, in preparing such patent application based on the notebook documentation and the subsequently submitted Invention Disclosure. We worked diligently on the preparation of the patent application with patent counsel at McGuireWoods until a final draft patent application was completed to our satisfaction. All of the inventors were involved in reviewing and finalizing the application for the present invention prior to the filing of the above-identified application. For example, communications took place on at least on April 26, 2001 and June 1, 2001 and up to and including correspondences dated June 15, 2001.

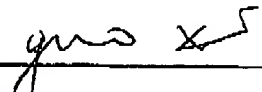
13. A final draft of the application was forwarded to us on June 14, 2001 from then McGuireWoods' attorney Kevin Reif in a letter dated June 14, 2001. At all times, we worked

Serial No. 10/093,784

diligently to finalize the application for filing in the U.S. Patent and Trademark Office from prior to June 4, 2001 to the finalized application on June 14, 2001, as evidenced herein.

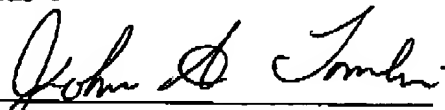
14. The patent application was filed in the U.S. Patent and Trademark Office on June 15, 2001.

15. We declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further, that the statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.



Xin Guo

July 29, 2004
Date



John A. Tomlin

July 29, 2004
Date

\\CONA432466.1



Disclosure

Created By: Xin Guo Created On:
Last Modified By: Xin Guo Last Modified On:

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Required fields are marked with the asterisk (*) and must be filled in to complete the form.

Summary

Status	Under Evaluation
Processing Location	YOR
Functional Area	900 Goyal-Systems & Software
Attorney/Patent Professional	Stephen C Kaufman/Watson/IBM
IDT Team	Stephen C Kaufman/Watson/IBM
Submitted Date	
Owning Division	RES
PVT Score	To calculate a PVT score, use the 'Calculate PVT' button.
Incentive Program	
Lab	
Technology Code	

Inventors with Lotus Notes IDs

Inventors: Xin Guo/Watson/IBM, John Tomlin/Almaden/IBM

Inventor Name > denotes primary contact	Inventor Serial	Div/Dept	Manager Serial	Manager Name
> Guo, Xin	2A7165	22/X8MC	889065	Martens, Marco
Tomlin, John A.	210307	22/X9BA	086336	Forrest, John J.

Inventors without Lotus Notes IDs

IDT Selection

IDT Team: Stephen C Kaufman/Watson/IBM	Attorney/Patent Professional: Stephen C Kaufman/Watson/IBM
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Response Due to IP&L :

Main Idea

Title of disclosure (In English)

System and method for bandwidth management: Pricing and capacity planning

Idea of disclosure

1. Describe your invention, stating the problem solved (if appropriate), and indicating the advantages of using the invention.
See attachment.

System and Method for Bandwidth Management: Pricing and Capacity Planning

Xin Guo & John Tomlin

Field of Invention: This invention is designed to integrate a variable pricing scheme into capacity planning for bandwidth management with multiple types of contracts.

1 Problem Statement:

Consider a re-seller who buys bandwidth in bulk and sells it in smaller bundles to customers. These bundles correspond to "contracts" made with customers to supply bandwidth in standard quantities for a specific time span. The type of contract bought defines a "customer class" or "customer type".

How should the reseller price these contracts? The reseller must not only choose prices which will attract customers, but also make sure that these customers do not collectively exceed the bandwidth available (i.e. sold). Since the behaviour of the end users is neither deterministic nor under the re-seller's control, we shall take this to mean that given the distribution of individual customer bandwidth consumption, the total available shall not be exceeded with some (high) probability at any time t within the planning horizon. This is accomplished by means of "chance-constraining" total bandwidth consumption.

2 Mathematical Formulation

We provide a chance-constrained optimization model for bandwidth management with multiple types of contract. Performance analysis and capacity planning are integrated with the pricing scheme. This is a discretized multi-time-period model, where the time t is specified in terms of multiples τ of a fixed period length Δ .

2.1 Notation and assumptions

Indices

- $i = 1, \dots, I$: customer class;
- $\tau = 1, \dots, T$: time periods, each of length Δ .

Assumptions

- For any fixed time t , real usages of signed-on customers for class i are identical independent normal distribution with mean $\mu_i(t)$ and variance $\sigma_i(t)$;
- number for customers of class i is Poisson with parameter λ_i , itself a function of price (see below)

Data

- δ_τ : tolerance on capacity violation in period τ ;
- C_τ : cost per unit of buying new capacity in period τ ;
- d_i : duration of contract (number of time periods) for customer class i ;
- D_i : actual duration of contract ($d_i\Delta$) for customer class i ;
- $n_{i\tau}$: number of existing contracts of type i still active at start of period τ ;
- $L_{i\tau}$: lower bound on contract price;
- $U_{i\tau}$: upper bound on contract price.

Variables

- b_τ : the bandwidth available in period τ (non-negative);
- a_τ : bandwidth purchased by re-seller in period τ (non-negative);
- $q_{i\tau}$: price to new (or renewing) customers for a new standard length contract of type i in period τ .

User Supplied Functions

$\lambda_i(q_{i\tau})$: the expected number of new customers of type i arriving in any period if the price for a contract is set at $q_{i\tau}$.

These are standard price-demand curves reflecting the elasticity of demand.

Constraints

In addition to the constraint on the availability of the bandwidth at each time τ and on the the price range, it is required that the total available shall not be exceeded with some (high) probability at any time t within the planning horizon:

$$b_\tau = b_{\tau-1} + a_\tau \quad (\tau = 1, \dots, T) \quad (1)$$

$$L_{i\tau} \leq q_{i\tau} \leq U_{i\tau} \quad (i = 1, \dots, I; \tau = 1, \dots, T) \quad (2)$$

$$\begin{aligned} & \sum_{i|\tau < d_i} \left[\lambda_i \tau \Delta \mu_i^2 + (n_{i\tau} + \lambda_i \tau \Delta)^2 \sigma_i^2 + (n_{i\tau} + \lambda_i \tau \Delta)^2 \mu_i^2 \right] \\ & + \sum_{i|\tau \geq d_i} \left[\lambda_i D_i (\mu_i^2 + \sigma_i^2) \right] + (\lambda_i D_i \mu_i)^2 - \delta_\tau b_\tau^2 \leq 0 \quad \forall \tau \end{aligned} \quad (3)$$

The constraint (3) is a deterministic expression of the requirement that:

$$Pr\{(\text{Bandwidth consumed by customers at time } t) > b_t\} \leq \delta_t$$

The mathematical details of this transformation are given in a technical report by the present authors.

Objective

Maximize the total revenue minus the purchase cost

$$\text{Maximize } \sum_{i,\tau} q_{i\tau} \lambda_i(q_{i\tau}) - \sum_{\tau} C_{\tau} a_{\tau}. \quad (4)$$

3 Method

Step 1 Data Acquisition and Inputs

- obtain mean and variance of the real usage of each customer class;
- obtain the price-demand curve data which determines the arrival rate for each customer class;
- obtain data on the number of existing customers in each class;
- obtain the bandwidth wholesale cost to the reseller and other items specified in the "Data" section above.

Step 2 Optimization

- Generate a computer model which embodies the objective (4) and the constraints (1, 2, 3);
- Use nonlinear programming software to solve the optimization problem.

Step 3 Outputs

- Based on the non-linear programming solution, design a price structure for the contracts offered to customers.

4 Advantages and benefits:

- Capacity planning and pricing policy are directly related to and reflective of the demand of the market;

- Under the proposed pricing policy, it is in the best interest of the customers to choose the level of the bandwidth service that best reflects their real demand; hence the capacity planning is more efficient;
- The pricing scheme provides more flexible choice of the bandwidth service level, allowing certain range of variance;
- The pricing policy is directly related to the real performance of the bandwidth service level; hence this model provides better control over possible bursts and helps to improve bandwidth management for both the company and the customer.

5 Prior Art

We are not aware of any prior art which combines chance constrained programming with variable pricing as a tool for bandwidth management.